

Women in STEM and Human Information Behavior: Implications for LIS Educators

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This paper reports preliminary data from research that seeks to inform the readers about the way that human information behavior and the use of scholarly resources impacts on women in the STEM fields. By focusing on the information behavior and information needs of women in STEM, this could lead to an increased use of academic library resources and services and even the development of specific services to meet the needs of women in STEM. The primary goal of this paper is to provide some preliminary findings on why there are so few women in the STEM fields. As a secondary goal this paper discusses the way that human information behavior can impact on the research behavior of male and female scientists in STEM and how this influences their use of libraries and research resources. Implications for LIS educators are suggested. LIS educators teaching future LIS practitioners are provided with some ideas to consider in terms of working with women in STEM and considering their information needs.

Introduction

According to the U.S. Bureau of Labor Statistics, Science, Technology, Engineering, and Mathematics (STEM) fields are expected to add 2.7 million new jobs by 2018. These jobs offer enormous prospects for those who are prepared and a huge missed opportunity for those who are not. Women are underrepresented in the STEM fields and with the expected growth in jobs in this field recruiting women would be beneficial. According to Leary (2012) the need to improve STEM education in the U.S. became a priority for government, business and academe following the release in 2005 of a congressionally mandated report, "Rising above the Gathering Storm." In a follow-up report released in 2010, the Academy and its companion National Academy of Engineering and Institute of Medicine said underrepresented groups (racial/ethnic minorities and women) represent a largely untapped pool of American talent that could help fill the coming wave of STEM jobs. Government-sponsored programs, such as those pro-

vided by the National Science Foundation, National Institutes of Health, and U.S. Department of Education TRIO Programs (for example, the Ronald E. McNair Post-Baccalaureate Achievement Program, which includes a faculty-supervised research component) support undergraduate research experiences (UGREs).

Women in STEM

The small numbers of women in the STEM fields has been a topic of national discussion in the USA for many years. Many scholars support the importance of mentoring in increasing participation of women and minorities in STEM fields. According to Milgram (2011) women and girls need to see female role models in the workplace that look like them over and over and over again. They need to receive the message that women can work in STEM careers and be successful and fulfilled in their work. The best example of an outreach campaign to recruit women to male-dominated jobs is "Rosie the Riveter," developed by the U.S. government

and based on a real female factory worker, Rose Monroe (Milgram, 2011). Another important element of modern outreach campaigns is conveying the message that women in STEM careers can balance their work demands with their personal and family life (Milgram, 2011).

However, the number of women in STEM is still not consistent with the number of women in college in the USA. College-age women have been reported to be less likely to major in STEM fields and to be retained at a lower rate than are men (Freeman, 2004; Planty *et al.*, 2009). According to King (2010) while women comprise approximately 57 percent of college students nationwide their presence in higher education has yet to translate consistently to representation in the STEM fields. Whereas women are attending college at unprecedented rates and constitute more than half of university and college populations, they continue to be underrepresented in science, technology, engineering, and mathematics (STEM) fields (Planty, Kena, & Hannes, 2009).

Human Information Behavior in the STEM Fields

Wilson (2000) defines human information behavior as the “totality of human behavior in relation to sources and channels of information, including both active and passive information seeking, and information use” (p. 49). Typically, information seekers are more likely to obtain information from sources that they are familiar with rather than to seek other avenues which was noted in work done by March and Simon (1958) and Allen (1977). Google, and other Internet search engines, have also changed the way that information seekers search for information and this is true even in the STEM fields. In a study on information seeking by academic scientists Niu and Hemminger (2011) surveyed scientists from five research universities in the United States and found that some searchers preferred the Google in-

terface than that of their library. However, searchers who preferred Google tended to be less confident that they were finding the information they needed and research staff and adjunct faculty were found to use Google more than senior professors (Nui and Hemminger, 2011). In terms of preferred sources Niu and Hemminger (2011) found that scientists use electronic sources over print sources and “electronic journals subscribed to by the library and electronic open-access journals were the two primary resources most utilized” (p. 342).

Gender Differences in Human Information Behavior in the STEM Fields

Gender differences played a role in the in terms of the number of articles that scientists retrieved showing that males tend to retrieve more papers from electronic journals than females (Nui and Hemminger, 2011). Male scientists also prefer the Google interface rather than that of the library. Women preferred the organization of the library’s search interface when conducting academic research (Nui and Hemminger, 2011). Regardless of gender among the scientists, however, the more experienced searchers used the library websites to search for academic information more often. Women also tend to care more about open access journals than males. Among the scientists surveyed, males have more confidence when conducting academic searches than women (Nui and Hemminger, 2011).

STEM Information Seekers in the Library

According to Anderson (2001) four reasons for not contacting library personnel potentially include:

- classification systems which may or may not fit the user’s needs
- time constraints, i.e. the idea that information carriers are chosen on the basis

of return on the investment of limited time (Von Seggern, 1995)

- rational behavior based on estimates of cost and probability of success
- the intermediary role of library personnel

While library personnel may not be contacted often electronic sources are frequently used by STEM professionals. As Nui and Hemminger (2011) found when studying the information seeking behavior of scientists: when the searcher is confident and has experience conducting searches contacting library personnel is not always necessary.

Hemminger, Lu, Vaughn, and Adams (2007) also studied the information seeking behavior of academic scientists. The scientists indicated “four of the top five sources are electronic and print library journals, open access or otherwise free journals, and author Web sites” (p. 2211). While using print library journals was indicated as one of the top four sources that scientists use the majority of the scientists indicated that they visit the library “fewer than 10 times a year in person” (p. 2213). Nui and Hemminger (2011) found that male scientists do visit the library more often than females. However, the location of the library on campus does play a role in terms of how often the scientists visit the physical library.

Implications for LIS Educators to Consider when Teaching Future LIS Practitioners

When working with women in STEM and thinking about their information needs there are several things LIS educators may wish to consider in terms of preparing future LIS practitioners. LIS educators should think about the information needs and behaviors of women in STEM. LIS educators should also think about how to teach future LIS practitioners about approaching women in STEM so they are able to find the information that

they need. Since women in STEM tend to prefer using the library’s search interface, but are less confident when conducting academic searches LIS educators should take that into consideration when teaching future LIS practitioners. This means making sure that the practitioners are able to assist women in STEM when they are searching for academic information and teaching women how to conduct efficient searches using the library’s search interface.

Since women are underrepresented in STEM providing courses or tutorials targeting this group could provide the much needed assistance that women require when majoring in the STEM fields. By providing courses and tutorials for women in STEM this also supports the women and could build a strong relationship between women in the STEM fields and LIS practitioners. Providing this type of support outside of the STEM fields also shows that there are other faculty members there for support. This support could possibly be a way to help retain women in STEM. Support is crucial for women in STEM and knowing that there are people who know how to support them is important.

This research forms part of the author’s PhD research and is ongoing.

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